Circuit symbols: the chart

The standard set (BS EN 60617; the same shapes in US and Australian courses), including every symbol the GCSE specifications require. On a cell the long line is positive. On a diode the arrow shows the direction current can flow.



Cell
one source of potential difference; the long line is the positive terminal



Battery
two or more cells joined



Open switch
breaks the circuit: no current

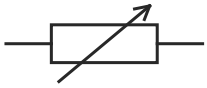
Closed switch
completes the circuit



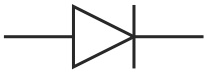
Lamp (bulb)
converts electrical energy to light and heat



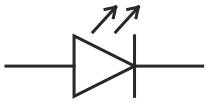
Resistor (fixed)
limits the current; a fixed resistance



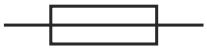
Variable resistor
a resistance you can change by turning a dial or sliding a contact



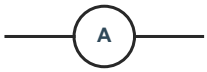
Diode
lets current through one way only (the direction of the arrow)



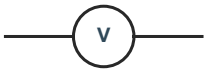
LED
a diode that gives out light when current flows the right way



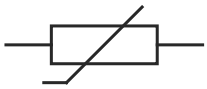
Fuse
a thin wire that melts and breaks the circuit if the current is too big



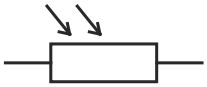
Ammeter
measures current, in amperes; connected in series



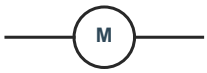
Voltmeter
measures potential difference, in volts; connected in parallel across a component



Thermistor
a resistor whose resistance falls as it gets hotter; used in thermostats



LDR (light-dependent resistor)
a resistor whose resistance falls as the light gets brighter; used in automatic lights



Motor
converts electrical energy to movement



Buzzer
converts electrical energy to sound



Capacitor
stores charge; used in timing circuits (A-level, not GCSE core)

From sciencewithshobha.com/blog/electrical-components-and-circuit-symbols-the-chart-of-cell-battery-switch-lamp-resistor-variable-resistor-diode-led-fuse-ammeter-voltmeter-thermistor-ldr-motor-and-buzzer-what-each-does-series-and-parallel-rules-and-a-printable-sheet/ · 1-on-1 online physics and science, Grade 6 to AP and A level, free 30-minute first class.

Meters, series and parallel rules, practice

Meter	Measures	Connected	Why
Ammeter	current (A)	in series, in the loop	the current must pass through it; almost no resistance
Voltmeter	potential difference (V)	in parallel, across the component	it reads the difference between the two ends; very high resistance

Series (one loop)	Parallel (branches)
the same current through each component	the potential difference across each component is the same
the supply potential difference is shared between the components	the total current is the sum of the currents through the branches
resistances add: R total = R1 + R2	the total resistance is less than the smallest branch resistance

Equations: charge flow = current × time (Q = I t); potential difference = current × resistance (V = I R). Current is the rate of flow of charge; the greater the resistance, the smaller the current for a given potential difference. (AQA GCSE Physics 8463, 4.2.)

Drawing a diagram

[ ] Ruler: straight wires, right-angled corners, a rectangle unless there is a reason.
[ ] Supply on one side, long line positive; components on the lines, standard symbols only.
[ ] Parallel branches as separate loops, junctions dotted.
[ ] Ammeter in the loop, voltmeter across the component; values labelled beside the symbols.

Practice

[ ] 1. 6 V battery, two identical lamps in series: potential difference across each?
[ ] 2. The same lamps in parallel: potential difference across each?
[ ] 3. 2 A through 6 Ω: potential difference?
[ ] 4. 0.5 A for 2 minutes: charge?
[ ] 5. 4 Ω and 8 Ω in series: total resistance? In parallel: more or less than 4 Ω?
[ ] 6. An LED connected backwards: what happens?
[ ] 7. Which component switches a street light on at dusk?
[ ] 8. Which is wrong: a voltmeter in the main loop, or an ammeter in the main loop?

Answers

1) 3 V each. 2) 6 V each. 3) 12 V. 4) 60 C. 5) 12 Ω; less than 4 Ω. 6) no current; it stays dark. 7) an LDR. 8) the voltmeter in the loop (it stops the current); an ammeter belongs in the loop.

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